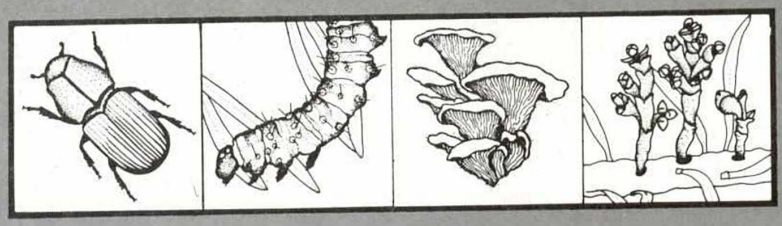
Forest Pest Management



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MOUNTAIN PINE BEETLE STATUS AND POTENTIAL, PLAINS/THOMPSON FALLS RANGER DISTRICT, LOLO NATIONAL FOREST

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ABSTRACT

The series of mountain pine beetle infestations existing on the Plains/Thompson Falls Ranger District, Lolo National Forest, since 1971 continued into 1988. While some infestations are waning, others are increasing. The potential for beetle-caused mortality exists in threatened, but as yet uninfested stands. Management alternatives are discussed.

INTRODUCTION

A series of mountain pine beetle (*Dendroctonus ponderosae* Hopkins) epidemics has existed on the Plains Ranger District (RD) since 1971 (McGregor et al., 1977). By 1974, approximately 1,850 acres were infested in the upper Thompson River drainage. Gibson, et al. (1979) reported the infestation on the District had extended to 24,561 acres in 1978. Data collected from nine surveyed areas located throughout the infestation showed an average of 21 trees per acre killed in 1978. The following year, Gibson and Bennett (1980) noted an additional 27 trees per acre were killed on surveyed sites. Since that time, infestations on the District (now the combined Plains/Thompson Falls RD) have fluctuated yearly--increasing in some stands while decreasing in others. Though reports specific to the District have not been written since 1980, data have been collected and are available in other office reports (McGregor et al., 1985; Tunnock et al., 1986; Gibson and Oakes, 1987; Gibson and Oakes, 1988). In 1988, aerial surveys flown on the District showed more than 31,000 acres still infested.

SURVEY METHODS

In addition to annual aerial surveys which are flown over most forested lands in the Region, infestation data are collected on the ground from as many infested areas as we can practicably survey each year. Ground-collected data are particularly important in determining outbreak status and potential. Aerial survey information, as valuable as it is, is 1 year old when it is mapped because trees recorded as "faders" are those attacked the previous year.

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Ground data are collected from sets of variable-radius plots established in selected areas from which current infestation information is desired. Data are obtained following beetle flight--typically after September 1. Plots are established along a compass line and spaced to capture as much stand variation as possible. A "set" of plots usually contains five plots. Plot radii are variable--using a basal area factor (BAF) 10. "In" trees, equal to or greater than 5 inches d.b.h., are recorded by species, diameter (to the nearest inch), and "damage code." Damage codes are: undamaged, current-year attack, previous-year attack, older dead, unsuccessful attack, strip attack (current and older), secondary bark beetle attack (current and older), "other" damaging agents,and unknown mortality. Data are analyzed using the computer program INDIDS (Bousfield 1980).

This year, we collected data from 10 areas of current or expected mountain pine beetle infestations on the District. In addition, data are included from 30 permanent beetle population trend plots located in Murr Creek and North Fork Murr Creek drainages (Gibson et al. 1980).

RESULTS AND DISCUSSION

Figure 1 shows plot locations from which data were collected in 1988. Table 1 shows compiled results from those data sets. Current-year attacks (1988) range from none at Thompson Pass (5) and Stand #10-02-16 (8), to 37 trees per acre in the Alder Creek plots (3). Total standing dead to date ranges from none at Thompson Pass to 155 trees per acre on the Murr Creek permanent plots. Data were run through the mountain pine beetle rate of loss model (Cole and McGregor, 1983) to predict beetle-caused mortality over a 10-year infestation in stands of those characteristics. Combined actual and predicted mortality ranged from a low of 70 trees per acre (30 percent lodgepole pine component of stand), to 200 trees per acre (29 percent lodgepole pine component). In other stands, Murr Creek, e.g., though total trees per acre killed were fewer (155), impact on lodgepole pine component was greater (50 percent).

Table 1.--Effects of MPB on stand structure in selected stands on Plains/Thompson Falls RD, 1988. (All figures are trees/acre ≥ 5 inches d.b.h.).

	Plot location	Total green stand	Total green LPP	1988 attacks	1987 attacks	Older dead	Predict. mortal. (10 yrs.)	Total dead (act. & pred.)	Remain. (10 yrs.)	% orig. LPP killed	% orig. stand killed
1.	McGinnis Cr.	367	214	22	45	64	4	135	210	39	27
2.	Cabin Cr.	443	435	24	0	10	68	102	367	19	19
3.	Alder Cr.	501	501	37	22	18	123	200	378	29	29
4.	Hinchwood Cr.	211	183	36	66	30	13	145	170	44	41
5.	Thompson Pass	659	452	0	0	0	135	135	317	23	17
6.	Old Mine	605	586	3	0	10	164	177	422	23	23
7.	Ridge Top	314	254	5	2	12	127	146	127	37	32
8.	10-02-16	241	160	0	1	0	62	63	98	28	21
9.	10-02-01	284	167	4	12	2	52	70	115	30	20
10.	10-02-03	254	199	6	0	5	83	94	116	32	27
11.	Murr Cr.	204	156	22	22	111	< 1	155	156	50	43

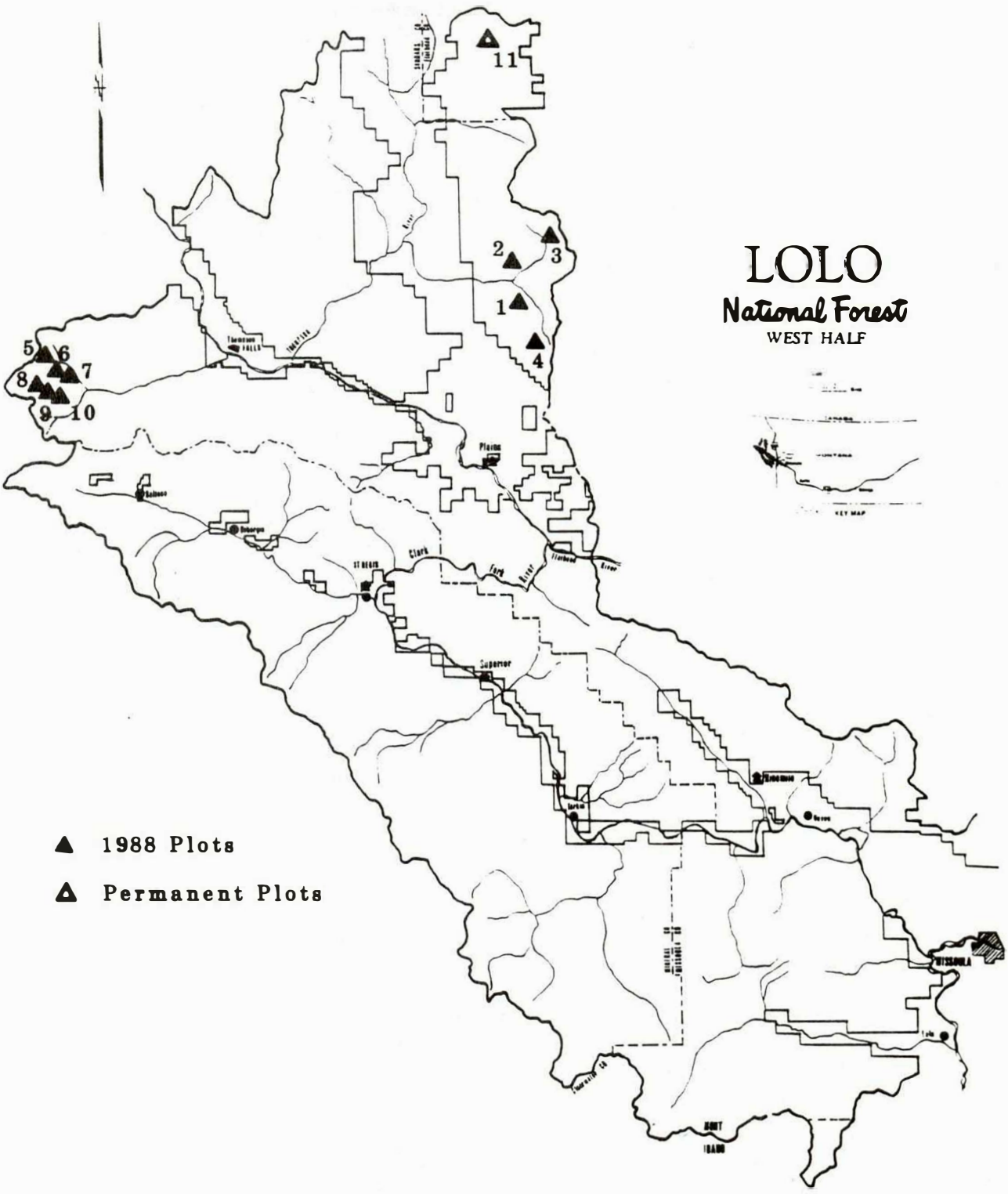

Figure 1.--Locations from which data were collected in 1988 (numbers refer to plot listings on Table 1).

Figure 2 shows progression of mountain pine beetle outbreak areas on the District from 1985 through 1988. Table 2 quantifies those areas by showing acres infested and aerial survey estimates of trees killed and affected volume for that same time period. As noted, the infested area increased markedly from 1985 to 1986, declined somewhat in 1987, then increased once again in 1988. Infestations on lands of all ownerships (Federal, State, and private) are included. Note the western-most part of the District (Prospect Creek) was not flown in 1985 and 1988. That omission was intentional in 1985 as little insect activity had previously been found there. The oversight in 1988, however, was inadvertent. In total, 31,159 acres of all ownerships within District boundaries are still infested. Of that total, 30,624 acres are in lodgepole pine type, 529 ponderosa pine, and small amounts of western white and whitebark pines.

Table 2.--Aerial survey impact estimates[1] of mountain pine beetle infestations, Plains/Thompson Falls RD, 1985-1988.

Year	*Acres Infested*	*Trees killed (estimated)*	*Volume loss (estimated)*
1985	*16,966*	*52,185*	*4,164 MBF*
1986	*34,311*	*89,451*	*7,162 MBF*
1987	*24,642*	*24,931*	*1,994 MBF*
1988	*31,159*	*102,059*	*8,165 MBF*

[1] *All host species on all ownerships*

In general, mountain pine beetle infestations Regionwide are declining. More than 722,000 acres were infested throughout the Region in 1987. In 1988, that has been reduced to less than 560,000 acres. Still, some local areas are experiencing increasing beetle populations. A few of those are on the Plains/Thompson Falls RD. Several lodgepole pine stands in the Hinchwood Creek drainage harbor still-building outbreaks. Other stands, such as those in the upper portions of Prospect Creek, are just becoming susceptible to beetle infestations. There may be others on the District which are within, or soon will be within, the following high-hazard characteristics for lodgepole pine stands: greater than 80 years of age, 8 inches or greater average stand diameter, sites environmentally capable of supporting beetle populations, and where phloem thickness on individual trees is sufficient to provide adequate food for developing broods.

Management guidelines for lodgepole pine stands infested or threatened by beetles have been developed. Options range from clearcutting severely damaged or overmature stands, to sanitation thinning to forestall anticipated mortality (Amman 1976; Amman et al., 1977; Bollenbacher and Gibson 1986; McGregor et al., 1987). Recently, mountain pine beetle pheromones have been identified, synthesized, and proven to be useful in manipulating beetle populations to the land managers' advantage (Borden et al., 1983, 1986, 1987). Alternatives chosen for a particular stand will be determined by stand and site factors, beetle outbreak status, various resource considerations and ultimately, management objectives.

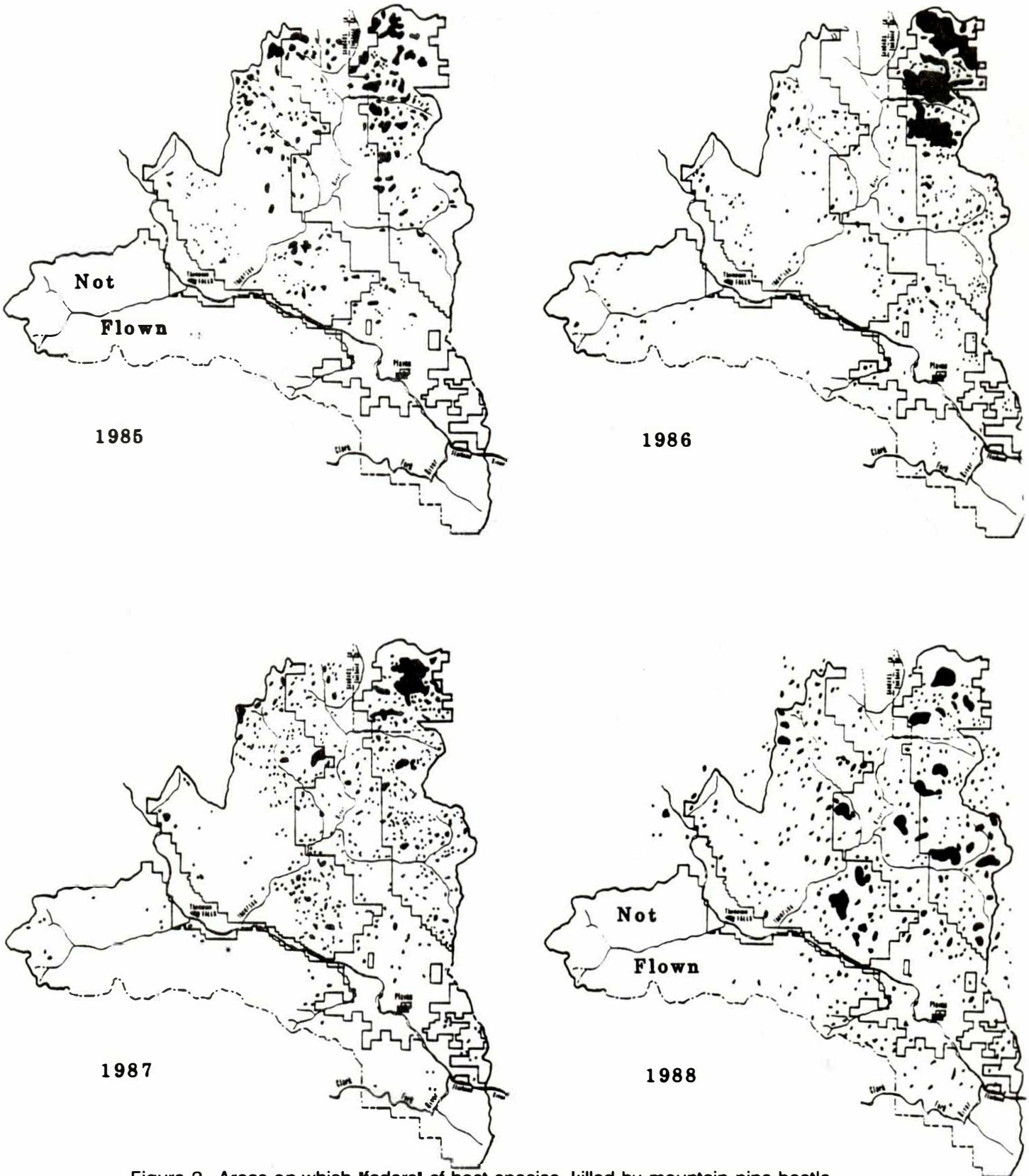

Figure 2.--Areas on which "faders" of host species, killed by mountain pine beetle, were observed on Plains/Thompson Falls RD, 1985-1988.

CONCLUSIONS

In summary, the land manager must realize that where stands of host species susceptible to mountain pine beetle exist, they likely will be infested at some time. Beetle-caused mortality in any particular stand will vary depending on site and stand conditions, environmental factors, and beetle populations in the stand and adjacent ones. While there are few "absolutes" in typical biological systems, historical evidence suggests the probability of high-hazard lodgepole pine stands being infested is great. Mortality in stands of pure lodgepole pine may exceed 90 percent of the trees over 5 inches d.b.h. It is for the land manager to decide--basing decisions on all resource considerations--whether infestation risks and potential losses of that magnitude are acceptable.

The most valid strategy in management of beetle populations is prevention. To the extent beetle outbreaks can be prevented--through silvicultural manipulations designed to eliminate or reduce susceptibility of stands most likely to be infested--beetle-caused losses can be kept within tolerable levels. Where highly susceptible stands are infested, the infestation potential becomes greater in less susceptible stands nearby. That should be considered when deciding to allow beetle infestations to run their course in stands where timber values may not be primary. In those cases, threats to adjacent stands may likewise be unacceptable.

Potential losses from depredations by mountain pine beetles will always be a management concern in host stands. Dependent upon an array of biological, economical and political decisions, those potentials may or may not be realized. Some comfort may be derived from the knowledge that they need not be inevitable.

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